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much the appearance of a multipolar spindle. These fibers bear no relation to the true spindle which now makes its appearance. No centrosomes were observed, and only four chromosomes of which two passed to either pole. The chromosomes changed greatly in shape as they moved along the spindle, indicating a very plastic nature. The second division follows at once, giving rise to the nuclei which pass into the spores. In some instances a third division takes place within the basidium, and as a result there is a degeneration of four of the nuclei.

FRIES[18] finds in *Hygrophorus conicus* that the cells of the trama contain one or more pair of nuclei, while the cells of the subhymenium have only a single nucleus, each having a conspicuous nucleole and two distinct masses of chromatin. Basidia, even the youngest, are uninucleated with the same double nature of the chromatic content. Growth of the basidium is accompanied by a corresponding growth in size of the nucleus, and the chromatin assumes the nature of a long delicate spireme thread. Following closely upon this there is a disappearance of the nuclear membrane and a sudden contraction of the spireme into a compact mass surrounded by a granular (plasma) cytoplasm. Spindle fibers now appear (no centrosome was found) and two chromosomes are seen to pass to each pole. The daughter nuclei, which at this stage lie near the apex of the basidium, are fully reconstructed and move toward the base of the basidium, where they remain while the sterigmata are developed. As soon as the sterigmata are fully formed, the nuclei in most cases become beaked and pass into the spore and divide; in other instances the division is partly completed in the basidium.

The first of these papers describes a process which is usually considered the typical method of nuclear behavior in the higher Basidiomycetes. We have here the fusion of nuclei, a synapsis, a spireme (double in its nature), a heterotypic followed by homotypic division.

In the second paper we have no fusion of nuclei, but stages are described and figures given which compare favorably with those of the preceding paper, although the author does not admit of chromosome reduction.

The third paper describes a form unique in that the cells of the trama contain more than one nucleus, while the basidium contains but one, and this according to the author is not a fusion nucleus. Therefore the division in the basidium is not a reduction division.—E. M. GILBERT.

Amanita.—Dr. RENÉ FERRY, former editor of the *Revue Mycologique*, has recently published a paper of a monographic nature dealing with the "deadly" Amanitas,[19] with special reference to their botanical characters, chemistry, and toxicology. The first part is devoted to descriptions of the three species which the author believes are responsible for the deaths from mushroom poisoning: *Amanita phalloides*, *A. verna*, and *A. virosa*. *A. phalloides* is recognized as a very variable species. Good descriptions are given of these species and of the varieties of *A. phalloides*, and the determination of the species is further aided by colored illustrations, including the American varieties which are copied from PECK's Report. Not all students may agree with FERRY in his treatment of these species, but it is doubtful if anyone can at present, or even in the near future, limit and characterize the species of *Amanita* in a manner which will be acceptable to all. The author's object, however, is not so much to limit precisely the natural species as it is to present characters and illustrations by which the deadly species of this genus may be recognized by those who have little technical knowledge of the fungi.

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[18] FRIES, ROB. E., Zur Kenntnis der Cytologie von *Hygrophorus conicus*. Svensk. Botanisk. Tidskrift **5**: 242–251. 1911.

[19] FERRY, RENÉ, Étude sur les Amanites; les Amanites mortelles. *Amanita phalloides*, *Amanita verna*, et *Amanita virosa*. Rev. Mycologique. Suppl. 1. pp. 1–96. *pls. 1–8.* 1911. Saint-Dié (Vosges), France. 4.50 fr. On sale by the author.

The second part, covering more than 70 pages, is a thorough discussion of the recent work, in Europe and America, on the chemistry and toxicology of these three species, particularly of *A. phalloides*. There are two important toxic principles. Phalline (KOBERT) or "Amanita-hemolysine" (FORD) is a hemolytic agent which dissolves the red blood corpuscles. Its chemical nature is uncertain (FORD), but temperatures of 65–70° C. destroy it, so that thorough cooking renders this poison innocuous. The other toxic principle is "Amanita-toxine" (FORD), which is not destroyed by heat, and for which no antidote is known. Its chemical nature is unknown. Hemolysine is found in certain of the edible fungi, for example *Amanita rubescens*, and this emphasizes the necessity of thorough cooking of all mushrooms. There is a thorough discussion of the symptoms of poisoning by these toxins, treatment, precautionary measures, experiments on immunization, etc. The work is a valuable one for those interested in the determination of these poisonous species, and particularly for the physician, pharmacist, etc.—G. F. ATKINSON.

Jurassic cones.—NATHORST[20] has described two new species of the Jurassic cone-impression known as *Cycadocarpidium*, has established definitely its identity with the leaf-genus *Podozamites*, and has discussed the relationship of this interesting gymnosperm. The leaves (*Podozamites*) are linear or elliptical, and seem, in certain species at least, to be borne on definite short shoots. The sporophylls (*Cycadocarpidium*) are much like the vegetative leaves, and are arranged in loose cones. Each sporophyll bears at its base two ovules, with pointed, winglike appendages. *Cycadocarpidium*, at first believed to be the fructification of a cycad related to the Zamieae, is considered by the author as a possible connecting form between cycadophytes and conifers. A fuller knowledge of both the vegetative and reproductive structures of the plant, however, lends little support to the theory of its cycadean affinity, and it seems

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[20] NATHORST, A. G., Über die Gattung *Cycadocarpidium* (Nathorst) nebst einigen Bemerkungen über *Podozamites*. Kungl. Svensk. Vetensk. Handl. **46:** no. 8. pp. 11.